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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/789,651	02/27/2004	James R. Markham	AFU-24	9181

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Iras S. Dorman
Suite 200
330 Roberts Street
East Hartford, CT 06108

EXAMINER	
MALEVIC, DJURA	

ART UNIT	PAPER NUMBER
2884	

DATE MAILED: 02/22/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/789,651	MARKHAM ET AL.	
	Examiner	Art Unit	
	Djura Malevic	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *19 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/22/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 – 4 and 12 – 15 are rejected under 35 U.S.C. 102(e) as being anticipated by Kameoka (US Pub. 20030184733 A1).

With regards to claims 1 and 4, Kameoka discloses a multiple gas analysis apparatus comprising a FTIR gas analyzer 10 including a gas sample cell 3 and a front-end unit 30 comprising a gas sensor that measures the concentration of a specific ingredient in the gas sample connected to the gas sample cell 3 of the FTIR gas analyzer 10 [0042]. Kameoka includes a sensor that detects atomic or homo-nuclear diatomic gaseous infrared-inactive components, since Kameoka teaches the use of a chlorine sensor, which is a gaseous infrared-inactive component. Kameoka further teaches that the gas sensor expands the range of gas samples that the multiple gas analysis apparatus can analyze, for instance the FTIR gas analyzer measures infrared-active components and the gas sensor such as, but not limited to, the chlorine sensor measures infrared-inactive components [0042-0047].

With regards to claim 2, Kameoka discloses one intake 3a (inlet conduit) and one outlet 3b (outlet conduit) to the gas cell and one sensor disposed for contact with the gases in the gas sample cell [0059] (Fig. 2 and Fig. 3).

With regards to claim 3, Kameoka disclose electronic data processing means programmed to determine the presence of infrared-active molecules in the gas sample wherein said processing means is operatively connected to a sensor (Fig. 1 and Fig. 2).

With regards to claims 12 and 15, Kameoka discloses a method for analyzing a gas sample wherein the gas sample may be any unknown gas sample such as toxic gases where immediate analysis of the unknown gas in all aspects is required [0050]. Kameoka also discloses a step of measuring the concentration of infrared-active component of the gas sample with the FTIR gas analyzer and concurrently measuring the concentration of infrared-inactive component with a gas sensor such as, but not limited to, a chlorine sensor, operatively connected to the cell of the FTIR gas analyzer [0042].

With regards to claim 13, Kameoka discloses one intake 3a (inlet conduit) and one outlet 3b (outlet conduit) to the gas cell and one sensor disposed for contact with the gas in the gas sample cell [0059].

With regards to claim 14, Kameoka disclose electronic data processing means programmed to determine the presence of infrared-active molecules in the gas sample wherein said processing means is operatively connected to a sensor (Fig. 1 and Fig. 2).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> *(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.*

Claims 5 – 9 and 16 –20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kameoka in view of Nishizawa *et al.* (US Patent 4,859,307).

With regards to claim 5, Kameoka discloses that the gas sensor may include a ceramic sensor that detects a gas using ceramics, an electrochemical sensor that detects a gas by an electrochemical action or an optical sensor that detects a gas by an optical action [0044]. However, Kameoka does not expressly disclose a sensor comprising a porous ceramic element determining the concentration of infrared-inactive component. Nishizawa teaches an electrochemical gas sensor comprising a porous ceramic element measuring the concentration of infrared-inactive component (Col. 7, Line 45). Kameoka and Nishizawa are analogous art because they are both from similar problem solving area, gas detection.

Thus, at the time of the invention it would have been obvious to a person of ordinary skill in the art to modify Kameoka to include the electrochemical gas sensor such as that taught by Nishizawa in order to provide a gas sensor that provides enhanced sensing accuracy, increased durability, and improve operating responses (Col 2, line 66). In addition, Kameoka teaches that the gas sensor may include any electrochemical sensor [0044].

With regards to claim 6, Nishizawa teaches that the sensor comprises a diffusion barrier of either pinhole or Knundsen (Col. 1, Line 41).

With regards to claim 7, Nishizawa teaches that the sensor is a limiting current oxygen sensor (Col. 7, Line 4).

With regards to claim 8, Nishizawa teaches that the sensor comprises self-heating means (Col. 10, Line 45) and said porous ceramic element comprises zirconia (Col. 10, Line 21).

With regards to claim 9, Nishizawa teaches that the gas sensor may be a hydrogen sensor (Col. 13, Line 7).

With regards to claim 16, Kameoka discloses a method for the analysis of a mixed gas sample, which may include a ceramic sensor that detects a gas using ceramics, an electrochemical sensor that detects a gas by an electrochemical action or an optical sensor that detects a gas by an optical action [0044]. However, Kameoka does not expressly disclose a sensor comprising a porous ceramic element determining the concentration of infrared-inactive component. Nishizawa teaches an electrochemical gas sensor comprising a porous ceramic element determining the concentration of infrared-inactive component (Col. 7, Line 45). Kameoka and Nishizawa are analogous art because they are both from similar problem solving area, gas detection.

Thus, at the time of the invention it would have been obvious to a person of ordinary skill in the art to modify Kameoka to include the electrochemical gas sensor such as that taught by Nishizawa in order to provide a gas sensor that uses a porous ceramic structure which provides enhanced sensing accuracy, increased durability and improve operating responses. In addition, Kameoka teaches that the gas sensor may include any electrochemical sensor that detects by an electrochemical action.

With regards to claim 17, Nishizawa teaches a sensor comprises a diffusion barrier of either pinhole or Knundsen (Col. 1, Line 45).

With regards to claim 18, Nishizawa teaches a sensor consisting of a limiting current oxygen sensor (Col. 7, Line 4).

With regards to claim 19, Nishizawa teaches a sensor comprising self-heating means (Col. 10, Line 45) and said porous ceramic element comprises zirconia (Col. 10, Line 21).

With regards to claim 20, Nishizawa teaches that the gas sensor may be a hydrogen sensor exhibiting a change in resistance in relation to concentration of hydrogen in effective contact therewith (Col. 13, Line 7).

Claims 10, 11, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kameoka in view of *Hydrogen sensing using titania nanotubes* (2003) referred hereinbelow as "Varghese" or Akbar *et al.* (US Pub. 20040126624 A1).

With regards to claims 10,11, 21 and 22, Kameoka discloses multiple gas analysis apparatus and the method for analyzing a mixed gas sample claimed in claims 9 and 20 but does not expressly disclose a sensor comprising an array of nanotubes. Varghese teaches a hydrogen sensor using titania nanotubes. Kameoka and Varghese are analogous art because they are both from similar problem solving area, gas detection. At the time of the invention it would have been obvious to a person of ordinary skill in the art to modify Kameoka to include a hydrogen sensor using titanian nanotubes such as taught by Varghese, since titania nanotubes are highly sensitive to hydrogen which is a excellent characteristic for a hydrogen sensor. References such as Akbar, also teaches titania nanotubes are well known in gas sensors [0007].

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Reading et al. (US Pub. 20020026822 A1) teaches a gas analyzer system, which includes a plurality of sensing equipment.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Djura Malevic whose telephone number is 571.272.5975. The examiner can normally be reached on Monday - Friday between 8:30am and 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

DAVID PORTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2800

Djura Malevic
Patent Examiner
Art Unit 2884
571.272.5975